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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,311	08/06/2003	Timothy R. Armstrong	1030.0	8110

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EXAMINER	
HANDAL, KAITY V	
ART UNIT	**PAPER NUMBER**
1764	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/635,311	ARMSTRONG ET AL.	
	Examiner	Art Unit	
	Kaity Handal	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/9/2007 has been entered.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 includes, in line 1, the limitation "consisting of" which is not present in the Specification or any previous disclosure.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gittleman et al. (US 6,964,692 B2) in view of Asou et al. (US 2002/0150800 A1).

With respect to claim 1, Gittleman teaches an apparatus comprising a fuel reformer/autothermal reformer (1) (col. 3, lines 22-25) comprising a means/line for introducing gaseous fuel (in line (11)) and air (in line (16)) directly into said reformer; a heat exchanger (6) communicably connected directly to said fuel reformer/reactor (1), and a scrubber/adsorber (3) communicably connected to said heat exchanger (6) and further comprising a means/line (21) for passing scrubbed reformate from said scrubber/adsorber (3). Gittleman fails to show wherein said reformer (1), said heat exchanger (6), and said scrubber/adsorber (3) are communicably connected directly in series (as illustrated) so that gaseous material may pass through said reformers said heat exchanger and said scrubber sequentially due to the presence of a water gas shift reactor (2) and an additional heat exchanger (7) in between said heat exchanger (6) and said adsorber (3). However, it is known that omission of an element and its function is obvious if the function of the element is not desired. Therefore, omitting the water gas shift reactor (2) and the heat exchanger (7) is obvious given that hydrogen is produced in the reformer (1) and carbon monoxide and carbon dioxide is scrubbed/adsorbed in adsorber (3) (col. 4, lines 24-31). Ex

parte Wu, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989) (Claims at issue were directed to a method for inhibiting corrosion on metal surfaces using a composition consisting of epoxy resin, petroleum sulfonate, and hydrocarbon diluent. The claims were rejected over a primary reference which disclosed an anticorrosion composition of epoxy resin, hydrocarbon diluent, and polybasic acid salts wherein said salts were taught to be beneficial when employed in a freshwater environment, in view of secondary references which clearly suggested the addition of petroleum sulfonate to corrosion inhibiting compositions. The Board affirmed the rejection, holding that it would have been obvious to omit the polybasic acid salts of the primary reference where the function attributed to such salt is not desired or required, such as in compositions for providing corrosion resistance in environments which do not encounter fresh water.). See also In re Larson, 340 F.2d 965, 144 USPQ 347 (CCPA 1965) (Omission of additional framework and axle which served to increase the cargo carrying capacity of prior art mobile fluid carrying unit would have been obvious if this feature was not desired.); and In re Kuhle, 526 F.2d 553, 188 USPQ 7 (CCPA 1975) (deleting a prior art switch member and thereby eliminating its function was an obvious expedient). MPEP 2144.04 II A.

The claim uses "comprising" which is open transitional language and does not exclude a reference from having more elements than those recited in the instant claims. MPEP 2111.03 [R-3].

Gittleman does suggest recycling exhaust stream (24) containing the desorbed gases from adsorber (3) (col. 4, lines 60-62) to combustor (5) (as illustrated).

However, Gittleman fails to show wherein said apparatus has a means for recycling gases from said scrubber (3) to said reformer wherein said recycled gases are selected from at least one of the group consisting of carbon monoxide and methane. Asou teaches a hydrogen generator comprising a reformer (fig. 1, 3) and a carbon monoxide scrubber/purifying unit (5) comprising a means/valve (6) for recycling gases from said scrubber/purifying unit (5) to said reformer's (3) burner (8) (as illustrated) wherein said recycled gases are selected from at least one of the group consisting of carbon monoxide and methane/generated gas (generated gas would naturally contain a percentage of non purified carbon monoxide since no purification device perform at 100% efficiency) in order to supply gas to the reformer's burner (as illustrated) (page 1, paragraph [0003], lines 1-14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include in Gittleman's apparatus a means for recycling gases from said scrubber to said reformer wherein said recycled gases are selected from at least one of the group consisting of carbon monoxide and methane, as taught by Asou, in order to supply gas to the reformer's burner.

4. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gittleman et al. (US 6,964,692 B2), as applied to claim 1 above, and further in view of Hayes (US 5,709,914).

With respect to claims 2-3, Gittleman discloses all claim limitations as set forth above but fails to show wherein said heat exchanger comprises graphitic carbon

foam. Hayes teaches a heat transfer device (matrix 12) comprising carbon foam (col. 3, lines 18-23) in order to provide a heat exchanger having a high specific heat (col. 5, lines 9-12) thereby providing a cooling effect (col. 5, line 67 – col. 6, lines 1-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a heat exchanger comprising graphitic carbon foam in Gittleman's apparatus, as taught by Hayes, in order to provide a high specific heat heat-exchanger thereby providing a cooling effect.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gittleman et al. (US 6,964,692 B2), as applied to claim 1 above, and further in view of Wilson et al. (US 5,827,355).

With respect to claim 4, Gittleman teaches the need to convert carbon monoxide through placing scrubbers/selective oxidizers (50 and 54 as illustrated in figure 1), however, he fails to teach wherein said scrubbers comprise carbon fiber composite molecular sieve material. Wilson teaches removing carbon monoxide in industrial applications using carbon fiber composite molecular sieve material (col. 4, lines 35-48) in order to achieve low concentration of gaseous pollutants including carbon monoxide (col. 5, lines 33-40).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a scrubber comprising carbon fiber composite

molecular sieve material in Gittleman's apparatus, as taught by Wilson, in to achieve low concentration of gaseous pollutants including carbon monoxide.

Response to Arguments

Prior Art

Applicant's arguments filed 2/9/2007 have been fully considered but they are not persuasive.

Applicant argues on page 1 of the Remarks that:

> ... "Stated another way, Gittleman's system will not function without the shift reactor whereas the applicants' system is specifically designed to function without the shift reactor. Gittleman's shift reactor 2 is designed to effect a catalytic chemical reaction in which CO reacts with hydrocarbons and/or water to form additional (to that formed in his primary reactor 1) H2 and CO2. Whereas, the applicants' invention teaches away from Gittleman in that the product from the reformer 11 is cooled in heat exchanger 12 and then passed into scrubber 13..."

Examiner respectfully disagrees. Gittleman's system will function without the shift reactor (see col. 3, lines 47-57) where Gittleman teaches that the adsorber (fig. 1, 3) is capable of handling relatively high CO levels that cannot be toleratred by conventional systems. Furthermore, the adsorber (3) is capable or reducing the CO content in the reformate stream from a range of (0.5 - 5) mole % to a range of (50-100 ppm) (col. 3, lines 63 – col. 4, lines 14-17) whereas the water gas shift reactor is capable of reducing the CO from a range of 1-20 mole % to (0.5 - 5) mole % (col. 3, lines 28-30).

Applicant argues that Gittleman has no teaching or suggestion of a recycle loop to improve the efficiency of the reactions. Examiner respectfully disagrees.

Gittleman does suggest recycling exhaust stream (24) containing the desorbed gases from adsorber (3) (col. 4, lines 60-62) to combustor (5) (as illustrated). Therefore, it would have been obvious to recycle the same stream to the reformer instead. However, Asou teaches a hydrogen generator comprising a reformer (fig. 1, 3) and a carbon monoxide scrubber/purifying unit (5) comprising a means/valve (6) for recycling gases from said scrubber/purifying unit (5) to said reformer's (3) burner (8) (as illustrated) wherein said recycled gases are selected from at least one of the group consisting of carbon monoxide and methane/generated gas (generated gas would naturally contain a percentage of non purified carbon monoxide since no purification device perform at 100% efficiency) in order to supply gas to the reformer's burner (as illustrated) (page 1, paragraph [0003], lines 1-14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include in Gittleman's apparatus a means for recycling gases from said scrubber to said reformer wherein said recycled gases are selected from at least one of the group consisting of carbon monoxide and methane, as taught by Asou, in order to supply gas to the reformer's burner.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KH

3/17/2007

GLENN A. CALDAROLA
PRIMARY EXAMINER
~~GROUP 1100~~